

CLAIMS

We claim:

1. A thermal transfer material, comprising:
a heat spreader component, wherein the heat spreader component comprises a top
5 surface, a bottom surface and at least one heat spreader material, and
at least one thermal interface material, wherein the thermal interface material is
directly deposited onto at least part of the bottom surface of the heat spreader
component.
2. The thermal transfer material of claim 1, wherein the thermal material is further
10 coupled to a substrate.
3. The thermal transfer material of claim 2, wherein the substrate comprises silicon.
4. The thermal transfer material of claim 1, wherein the thermal transfer material further
comprises at least one adhesive component.
5. The thermal transfer material of claim 4, wherein the at least one adhesive component
15 is coupled to the heat spreader component.
6. The thermal transfer material of claim 4, wherein the at least one adhesive component
is coupled to the thermal interface material.
7. The thermal transfer material of claim 4, wherein the at least one adhesive component
is mixed into at least some of the thermal interface material.
- 20 8. The thermal transfer material of claim 1, wherein the heat spreader component
comprises a metal, a metal-based material, a high-conductivity non-metal or
combination thereof.
9. The thermal transfer material of claim 8, wherein the heat spreader component
comprises nickel, aluminum, copper or a combination thereof.
- 25 10. The thermal transfer material of claim 9, wherein the metal-based material or high-
conductive non-metal comprises silicon, carbon, copper, graphite, diamond or a
combination thereof.
11. The thermal transfer material of claim 10, wherein the heat spreader component
comprises a thickness of about 0.25 mm to about 6 mm.

12. The thermal transfer material of claim 11, wherein the thickness is from about 0.5 mm to about 5 mm.
13. The thermal transfer material of claim 1, wherein the thermal interface material comprises a crosslinkable thermal interface material.
- 5 14. The thermal transfer material of claim 1, wherein the thermal interface material comprises a phase change material.
15. The thermal transfer material of claim 1, wherein the thermal interface material comprises a polymer solder material, a polymer solder hybrid material or a combination thereof.
- 10 16. The thermal transfer material of claim 1, wherein the thermal interface material comprises a conductive filler, a metallic material, a solder alloy and combinations thereof.
17. A method of forming a thermal transfer material, comprising:
15 providing a heat spreader component, wherein the heat spreader component comprises a top surface, a bottom surface and at least one heat spreader material;
providing at least one thermal interface material, wherein the thermal interface material is directly deposited onto the bottom surface of the heat spreader component; and
20 depositing the at least one thermal interface material onto the bottom surface of the heat spreader component.
18. The method of claim 17, wherein the thermal transfer material further comprises at least one adhesive component.
19. The method of claim 18, wherein the at least one adhesive component is coupled to the heat spreader component.
- 25 20. The method of claim 18, wherein the at least one adhesive component is coupled to the thermal interface material.
21. The method of claim 18, wherein the at least one adhesive component is mixed into at least of the thermal interface material.

22. The method of claim 17, wherein the heat spreader component comprises a metal, a metal-based material, a high-conductivity non-metal or a combination thereof.
23. The method of claim 22, wherein the heat spreader component comprises nickel, aluminum, copper or a combination thereof.
- 5 24. The method of claim 22, wherein the metal-based material or high-conductive non-metal comprises silicon, carbon, copper, graphite, diamond or a combination thereof.
25. The method of claim 17, wherein the heat spreader component comprises a thickness of about 0.25 mm to about 6 mm.
26. The method of claim 25, wherein the thickness is from about 0.5 mm to about 5 mm.
- 10 27. The method of claim 17, wherein the thermal interface material comprises a crosslinkable thermal interface material.
28. The method of claim 17, wherein the thermal interface material comprises a phase change material.
29. The method of claim 17, wherein the thermal interface material comprises a polymer
15 solder material.
30. The method of claim 17, comprises a conductive filler, a metallic material, a solder alloy and combinations thereof.
31. A method for forming an IC package, comprising:
providing a thermal transfer material;
20 providing at least one adhesive component;
providing at least one surface or substrate;
coupling the at least one thermal transfer material with the at least one adhesive component to form an adhesive unit; and
coupling the adhesive unit to the at least one surface or substrate to form a thermal
25 package.
32. The method of claim 31, further comprising coupling an additional layer or component to the thermal package.
33. The method of claim 31, wherein the thermal transfer material comprises the thermal transfer material of claim 1.